Small Business Innovation Research/Small Business Tech Transfer

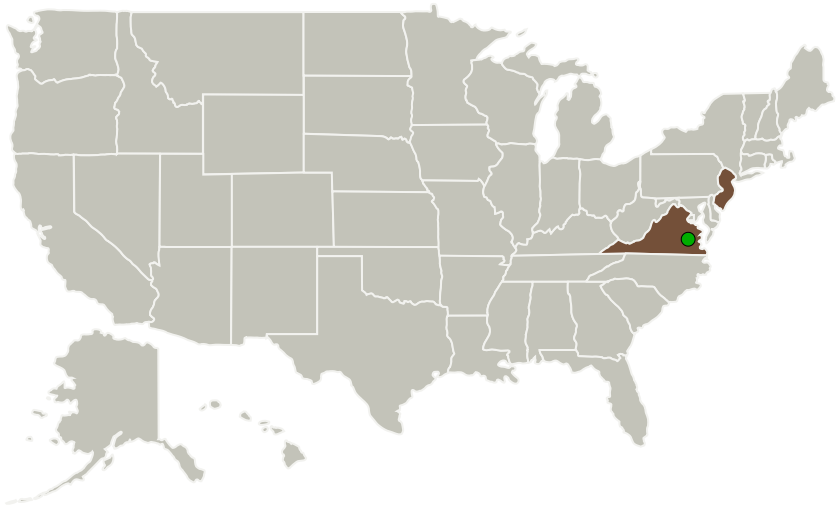
Space Flight of Ultra-Low Noise Quad Photoreceivers for Laser Interferometric Gravity Wave Detection, Phase I

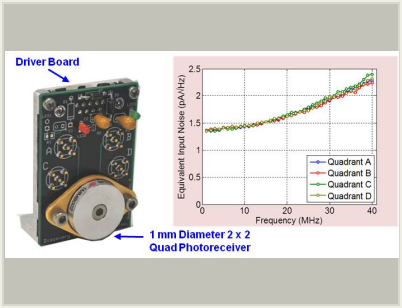
Completed Technology Project (2017 - 2017)

Project Introduction

Ultra-low capacitance quadrant InGaAs photoreceivers have been developed as part of the following successful NASA SBIR contracts by Discovery Semiconductors (DSC): (1) Phase I SBIR Contract # NNX09CD48P (01/22/09 to 07/21/09); and (2) Phase II SBIR Contract # NNX10CA59C (02/25/10 to 02/24/12). The photoreceivers are based on low capacitance per unit area photodiodes, combined with a commercial operational amplifier, and have achieved low cross talk, low capacitance, and low noise. With the successful completion of the design goals of the Quad Photoreceivers, the LISA community worldwide is eager to have these devices space-flight ready. Thus, the Materials International Space Station Experiment (MISSE) FF is a perfect vehicle to launch these quad receivers in space, and operate them for 12 to 18 months in harsh conditions. This view is strongly supported by Dr. Jeff Livas, Chief, Gravitational Astrophysics Laboratory, at NASA GSFC. Based on our prior experience with launching LIDAR InGaAs Photoreceivers on a MISSE 7 Flight, it is unrealistic to expect a MISSE FF launch in the 6 months short duration of this Phase I SBIR. Thus, our Phase I objective will be to perform the five key MIL-STD Tests, on the LISA Gravity Wave InGaAs Quad Photoreceivers. These tests will serve as a foundation for a potential MISSE FF Space Flight in Phase II SBIR of this program. MIL-STD reliability tests to be carried out in this Phase I SBIR are : (1) Mechanical Shock; (2) Vibration; (3) Thermal Shock; (4) Temperature Cycling; and (5) Damp Heat (humididty).

Primary U.S. Work Locations and Key Partners





Space Flight of Ultra-Low Noise Quad Photoreceivers for Laser Interferometric Gravity Wave Detection, Phase I Briefing Chart Image

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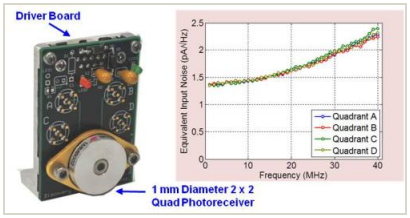
Organizations Performing Work	Role	Type	Location
Discovery Semiconductors, Inc.	Lead Organization	Industry Minority-Owned Business	Ewing, New Jersey
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
New Jersey	Virginia

Images



Briefing Chart Image
Space Flight of Ultra-Low Noise Quad Photoreceivers for Laser Interferometric Gravity Wave Detection, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/125937)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Discovery Semiconductors, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

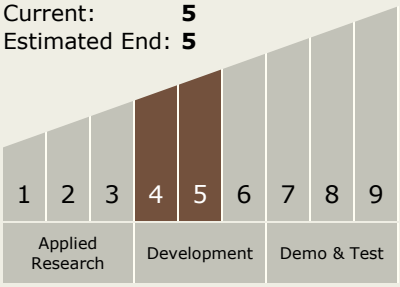
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Abhay M Joshi

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.1 Field and Particle Detectors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System